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The Lamberton Chlorate and Fertilizer Spreader

Designed at the Cooperative Weed Experiment Station, Lamberton, Minn.

Investigators and others who are working on the control of perennial noxious weeds have found that the application of dry chlorate is an effective means of control. Dry applications can be made easily on small patches. As with spraying, it is important that the application be uniform over the infested area. It is difficult to apply dry chlorate by hand except on small spots or individual plants.

The use of dry chlorate has created a demand for a simple, inexpensive machine that can be depended on to spread dry chlorate uniformly and at the recommended rate. This folder has been prepared for those who wish to construct a spreader for use on the farm. Directions and drawings for constructing the Lamberton chlorate and fertilizer spreader follow.

UNIVERSITY OF MINNESOTA
AGRICULTURAL EXTENSION DIVISION

Lamberton Spreader is Sturdy and Accurate

The Lamberton spreader is designed to be built and assembled by the average blacksmith or machinist. If the plans and instructions are studied carefully before actual construction is attempted and all parts are carefully measured and fitted, a sturdy, durable machine capable of fine adjustment and accuracy will result.

The hopper or body, the false bottom, the lid and wind guard are made of 20-gauge, galvanized steel. A sheet of this steel 36 inches wide and 6 feet long is required.

The ends (D, fig. 2) of the hopper are made of good clear grade pine, 1¼ inches thick and 12 inches wide. Two pieces 14 inches long are required.

Making the Cylinder

The cylinder (A, fig. 2) is made of 2½-inch iron pipe. It should be cut 33 inches long, and any rough or raised edges from cutting should be ground off. Six iron bars (B, fig. 2), or iron pipe, ¾ inch in diameter and 33 inches long, are then spot welded (or riveted) to the cylinder as shown in figure 2. If the bars are spot welded, be careful not to use excessive heat, causing the bars to warp.

Wooden plugs are then fitted tightly in both ends of the cylinder. Mark the center of both ends of the plugged cylinder (use a lathe if possible) and drill a ¾-inch hole in each end to receive the drive shaft or axle (C-1, fig. 2). This shaft should be ¾-inch cold rolled steel, 48 inches long. It is placed in position in the cylinder and fastened solidly by drilling ¼-inch holes through each end of the cylinder and shaft and keying the assembly together with ¼-inch flat head rivets, 3 inches long.

Making Hopper Ends

The hopper ends are made next. A center line (C, fig. 2) is drawn on each end board. This center line is spaced 5 inches and 7 inches as shown in fig. 2. Drill a ¾-inch hole, centered exactly 2½ inches from the bottom of each board on the center line, for the cylinder shaft. Place the end boards in position on the cylinder shaft. Now, holding a pencil with the point at the outside edge of one of the cylinder bars carefully turn the cylinder, marking the circumference of the assembled cylinder on the end board. Repeat on the other end. Now turn the cylinder several times to be sure that the pencil outline conforms to the outside path of the cylinder bars. Remove the end boards and with a steel square mark the outline of the ends by drawing a straight line from each upper corner to the extreme outside of the marked circle described by the cylinder. The outline should be as in figure 2. Shape the ends with a saw and rasp, keeping 1/16 inch outside of the marked outline. Replace the end boards on the assembled cylinder and place the entire assembly up-side-down on a level bench or box. Place a straight-edged board across the bottom, resting on the two end boards, and turn the cylinder to determine the clearance. Only the very bottom of the hopper need fit closely. A clearance of 1/16 inch at the extreme bottom of the hopper is correct. If necessary, rasp off more of the bottom of the end boards to give this clearance.

Making Sides for Hopper

The steel sides of the hopper are made and assembled as the next step. These are made of one piece of 20-gauge steel, 33 by 36 inches. Iron bars (E, fig. 1) ¼ inch by 1¼ inch, 36 inches long, are riveted to both ends of the sheet of steel as reinforcements for the top of the hopper. Drill ¼-inch holes, ⅝ inch in from the edge of the sides, for fastening the steel to the wood ends of the hopper (see fig. 1). In assembling the hopper body, use ¼-inch lag screws, 2½ inches long, through the top reinforcements, and ¼ inch round-head screws, 2 inches long, for the remainder. Now, with the cylinder shaft in place in the end boards, fasten the steel with lag screws at the top to both end boards and work around the hopper, binding the steel smoothly over the end boards and fastening it with screws. Care must be used in bending the steel over the bottom of the hopper to prevent kinks or bulges. Hold the steel sheet by the iron top bar when bending.

Adding the False Bottom

When the hopper is properly assembled, the cylinder should revolve freely, and have not more than 1/16-inch clearance at the extreme bottom. When this is attained, the false bottom is added.

A sheet of 20-gauge steel, 10 inches by 35 inches, is used for the false bottom (fig. 2). An iron bar, 3/16 inch by ¾ inch, 35 inches long, is riveted to one edge of the steel sheet (see G, fig. 2), and an iron rod, ½ inch in diameter, 37½ inches long, is riveted to the other edge (see F, fig. 2).

A stud (G-2, fig. 1) is made by setting a heated flat-head ¼-inch rivet, 2 inches long, in the center of the flat bar. When the spreader is completely assembled, this stud fits into the fork of the regulator (K, fig. 1). A hook (G-7, fig. 2) made of ¼ inch rod is spot welded 2 inches from each end of

the flat bar in the position shown in figure 2. These are used to fasten the false bottom in the closed position by springs (I, figs. 1 and 2).

The false bottom is now centered and bent over the hopper bottom, and the round bar of the false bottom is hinged to the hopper ends by strap irons, 3/16 by 1 inch, 6 inches long, drilled and fastened with screws as shown (H, fig. 2). Now hook the springs (I, fig. 2) in hooks on flat bar of false bottom and move false bottom to the right until it is even with hopper bottom. Fasten false bottom securely in this position with a clamp; be sure that it fits the contour of hopper bottom snugly. Three pieces of iron, 3/16 by ¾ inches, 11 inches long, are now heated and fitted over the false bottom between bars F and G, figure 2, as ribs or reinforcements for the false bottom. When bent and fitted, they are spot welded to bars F and G as follows: the first, 5 inches from right end of false bottom; the second, 17 inches from right side, and the third, 31 inches from the right side. It is important to get these measurements exact, so as not to interfere with the feed holes which are to be drilled next.

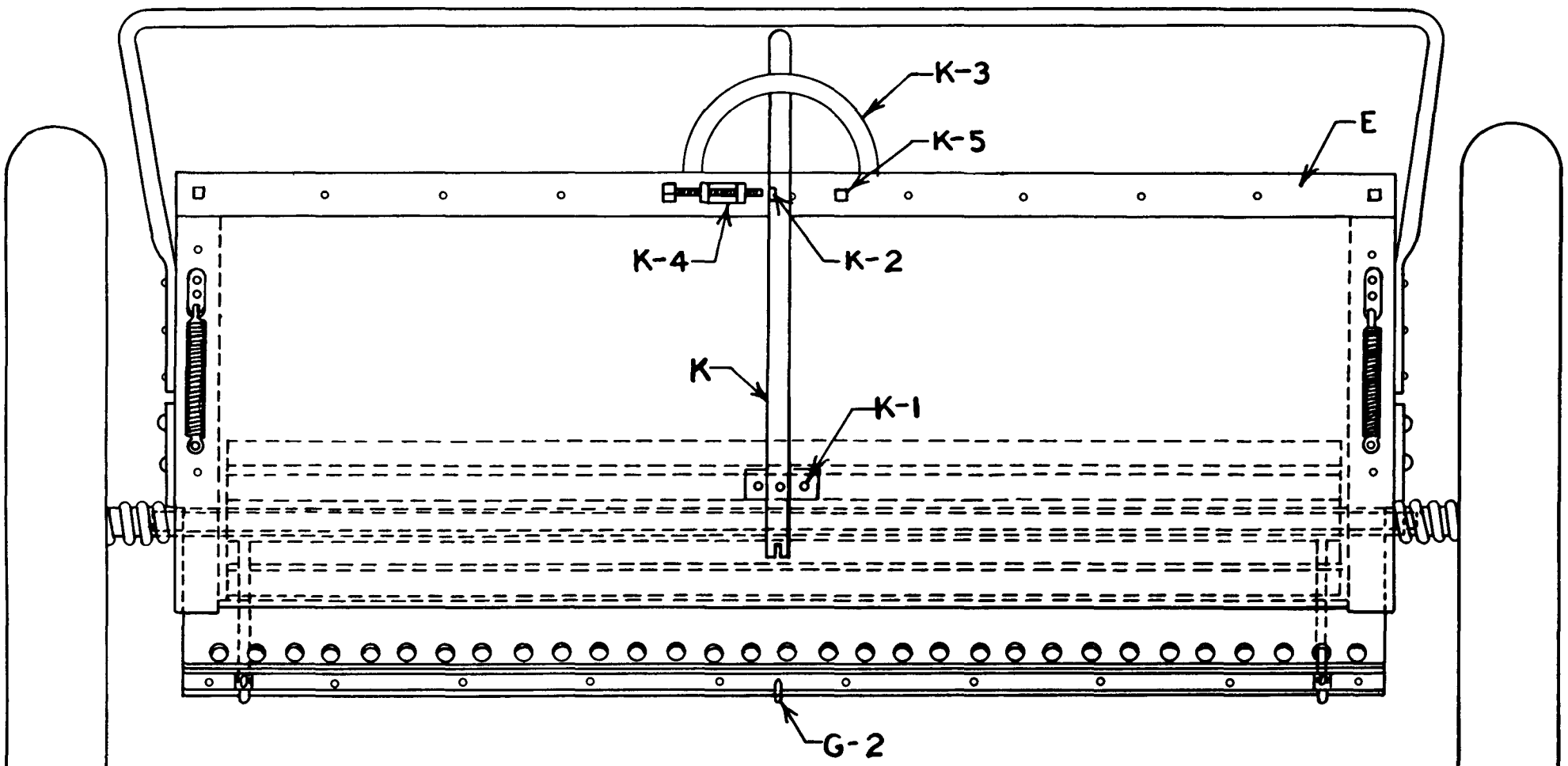
Drilling Feed Holes

With the false bottom smoothly in place and the right end even with the right end of the hopper, extend the center line (fig. 2) across the false bottom. Then starting 2 inches from right end of hopper, carefully mark and center punch 1⅛-inch intervals along the center line to the left end of the false bottom. Great care should be used in getting these intervals correct. Drill ½-inch holes through both false bottom and hopper bottom on these center marks, being very careful that the false bottom does not shift during the entire operation. (If the holes are drilled, first with a ⅛-inch drill and then enlarged with a ½-inch drill, no bending of the sheet steel will result). Now, unhook the springs, swing the false bottom open, and rasp off all rough edges resulting from the drilling. When the false bottom is closed, the springs should hold it snugly against the hopper, and by moving it from right to left every hole should be completely closed.

Installing Regulating Mechanism

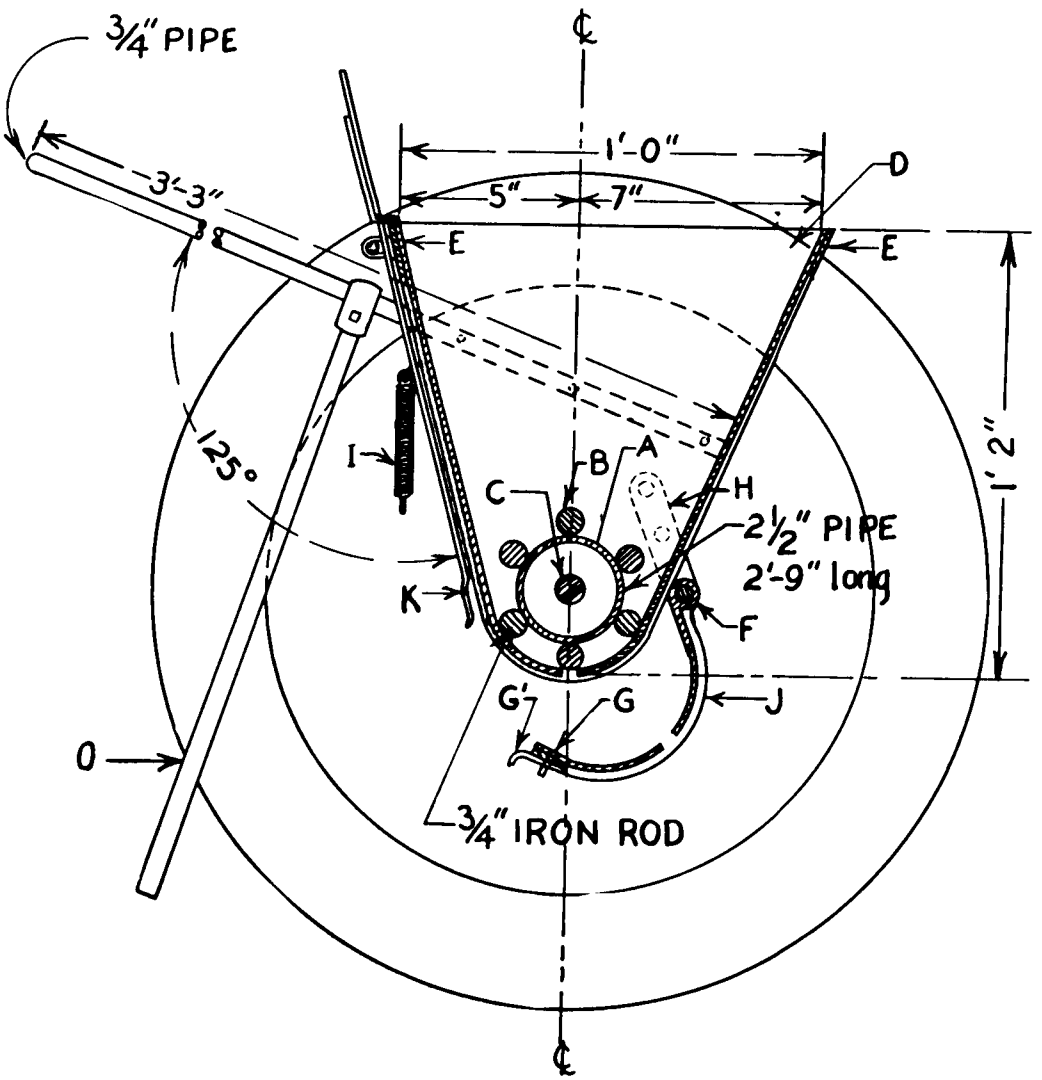
The regulating mechanism (K, fig. 1) is now assembled and installed.

The regulating lever (K) is fashioned from iron stock, 3/16 by 1 inch, 20 inches long. A slit ¼ inch wide and 1 inch deep is cut in one end of the lever to form the fork for receiving the stud in the center of the flat bar of the false bottom. This fork should be offset and shaped as shown in side view K, figure 2, to receive the stud easily when the false bottom is closed. An iron ½ by 1½ inches, 4 inches long (K-1, fig. 1), is riveted loosely to the handle, 2½ inches from the tip of the fork, and drilled for riveting solidly to the steel hopper as shown in figure 1. Close the false bottom, hook up the springs, and move the false bottom until

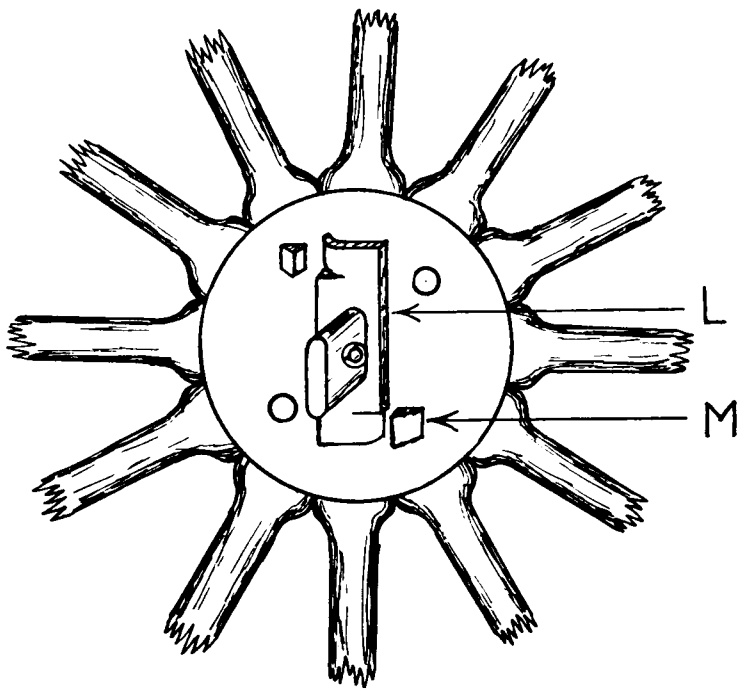


REAR ELEVATION FIG.1

the stud (G-2, fig. 1) is centered on the hopper. Place the fork of the lever on the stud, hold lever in vertical position, and fasten the block (K-1, fig. 1) to the hopper with ¼-inch, flat-head rivets. An arc (K-3, fig. 1) fashioned from iron stock, 3/16 by ¾ inch, 15 inches long, is spot welded to the iron reinforcement on the top of the hopper in the position shown in figure 1. The ends of the arc are offset slightly, to allow for free movement of the lever when assembled. Move the lever to the right until the holes in the hopper are completely closed, and spot weld an iron slug (K-5, fig. 1) in place as a stop for the lever. A feed regulator (K-4, fig. 1) made from a ½-inch machine bolt, 4½ inches long, threaded to the head and having two nuts is added in the position shown in figure 1. This is most easily attained by spot welding the two nuts (while on the bolt) to a piece of iron bar, 1½ inches long, 1 inch wide, and 3/16 inch thick, and then spot welding the assembly to the bar at the top of the hopper. An iron slug, (K-2, fig. 1) is



SECTIONAL VIEW
FIG. 2



Dog Details
Fig. 3

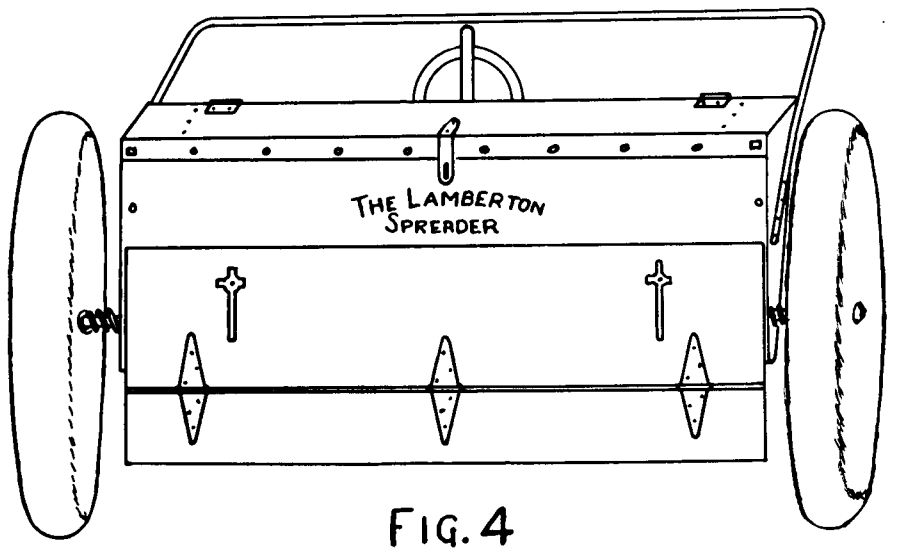


FIG. 4

welded to the lever in the position shown in figure 1 to act as a stopper for the bolt regulator. By adjusting this bolt, the openings in the hopper bottom can be regulated to deliver the desired amount of chemical.

The handle is made from a piece of ½-inch pipe, 114 inches long. This pipe is bent at right angles, 39 inches from each end, and bolted to the wood ends of the hopper as shown in figures 1 and 2. By placing the handle so that the open ends are 7 inches from the top of the hopper and the back end 3 inches from the top of the hopper, it will be at the correct angle when the spreader is completed.

Use Model T Wheels

If possible, secure Model T Ford wheels. Those carrying 30 by 3½ inch, clincher tires are lightest and best. Rear wheels require less rebuilding than front wheels. With rear wheels, it is only necessary to wash the bearing surface free of grease and dirt, pour the hub full of babbit, and center drill a ¾-inch hole for the spreader shaft. The wheel is placed with the brake drum in, as on the car. Two of the hub bolts are removed and machine bolts with the heads cut at an angle (see M, fig. 3) used to replace them. A thin washer is first placed on the axle, next to the wood end of the hopper, a 2-inch pressure spring (see fig. 1) is placed on the shaft, and the wheel, on the axle, is pushed in until the spring is slightly collapsed. Mark the axle on the outside edge of the wheel, remove the wheel, and work the end of the axle, outside of the wheel mark, down to the shape shown in the detail drawing, figure 3. A piece of iron, ¼ by 2 inches, 6 inches long, is now center cut to fit over the shaped axle end (L, fig. 3). A ¾-inch cut is made on diagonally opposite sides of this metal plate, 1 inch from either end. The tabs formed by these cuts are bent down as shown in figure 3, and when the wheel is replaced on the axle, the plate added, and held in place by a key through the axle, the tabs on the metal plate will act as dogs, catching against the bolt heads (M, fig. 3) when the wheels move forward, and slipping over the bolt heads when the wheel is reversed. This arrangement of the wheels makes for easy turning of the spreader by the operator and also permits the spreader to be pulled instead of pushed from one location to another, without the cylinder revolving.

A support to hold the spreader handle up when not in operation is made from ½-inch pipe, 30 inches long. The end of this pipe is heated and bent double, 6 inches from one end, slipped over the handle 6 inches from the box, and bolted firmly either by a bolt through the pipe or a U-bolt clamp (see O, fig. 2).

Hopper Cover and Wind Guard

A cover for the hopper is made from 20-gauge steel, hinged to the back edge of the hopper and fastened in the front edge with an ordinary hasp and halter snap.

A wind guard is made for the front of the spreader by hinging together two pieces of 20-gauge steel, the upper piece 8 by 35 inches, the lower 5 by 35 inches. This wind guard is fastened to the spreader by two bolts with wing nuts. Slits cut in the upper part of the wind guard to receive these bolts allow for adjustment of the guard up and down. For details of the cover and wind guard, see figure 4.

If desirable, tin disks may be fastened to the wheels to act as wind guards also.

If the spreader is used for fine chlorates or fertilizers, it is well to drill ¼-inch holes through each rib on the false bottom, directly beneath the hopper openings, and insert a ¼-inch rod the full length of the false bottom. This rod breaks up the stream of material coming from each opening and gives a fine distribution of the material.

Calibrating the Spreader

In calibrating the spreader, fill the hopper at least half full of the material to be spread, raise one end of the spreader so that the wheel is off the ground, and place a sheet of heavy paper (such as tar paper) under the machine to catch the chlorate. Measure the outside circumference of the wheel with the tire inflated. By dividing 90.75 feet (the distance the spreader must travel to cover one square rod) by the circumference of the wheel, you can determine the number of revolutions the wheel must make to cover one square rod with the material. By setting the adjustment lever to the right or left, turning the wheel the determined number of revolutions, then weighing the amount of material delivered, you can find the setting that gives the desired quantity per square rod. When this is established, the setting can be marked by a notch in the iron arc. In field operation, the adjustment bolt is set to stop the lever at the point marked on the arc. The lever which is within easy reach of the operator's hands is shoved to the right to close the feed holes completely in the hopper; to start the delivery of chlorate again it is shoved to the left until stopped by the adjustment bolt.

Painting and Care of Spreader

When completed, all grease and oil should be washed from the spreader, and the machine should be painted inside and out with two coats of good aluminum paint.

After each day's operation all chlorate should be removed from the hopper, the false bottom dropped by unhooking the supporting springs, and the hopper washed out with water and left out in the open air to dry.

Do not use oil or grease of any kind on the bearings. Chlorate and oil are **dangerous** as a mixture.

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